



# FINAL NAVAL AIR STATION ALAMEDA Restoration Advisory Board (RAB) Meeting Minutes

June 2, 2011

[www.bracpmo.navy.mil](http://www.bracpmo.navy.mil)

Building 1, Suite 140, Community Conference Center  
Alameda Point  
Alameda, California

The following participants attended the meeting:

## Co-Chairs:

Derek Robinson	Base Realignment and Closure (BRAC) Program Management Office (PMO) West, BRAC Environmental Coordinator (BEC), Navy Co-chair
Dale Smith	Restoration Advisory Board (RAB) Community Co-chair

## Attendees:

### RAB Members

Richard Bangert	Carol Gottstein, M.D.	Daniel Hoy
George Humphreys	Joan Konrad	James Leach
Jean Sweeney	Jim Sweeney	Michael John Torrey

### Community Members/ Public Attendees

Christina Felker	Fred Hoffman
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**Navy Members**

Cecily Sabedra

Navy Remedial Project Manager

**Regulatory Agencies**

David Cooper  
James Fyfe

U.S. Environmental Protection Agency (EPA)  
California Environmental Protection Agency Department  
of Toxic Substances Control (DTSC)

Melinda Garvey  
John West

EPA  
San Francisco Bay Regional Water Quality Control Board  
(Regional Water Board)

**City of Alameda Representatives**

Peter Russell

Russell Resources/ Alameda Reuse and Redevelopment  
Authority (ARRA)

**Contractors**

John McMillan  
Campbell Merrifield  
Tommie Jean Valmassy

Shaw Environmental, Inc.  
Trevet Environmental Consultants  
Tetra Tech EM Inc.

The meeting agenda is provided as [Attachment A](#).

**MEETING SUMMARY**

Derek Robinson (Navy Co-chair) called the June 2011 former Naval Air Station Alameda (Alameda Point) RAB meeting to order, welcomed all to the meeting and asked for introductions.

**I. Community and RAB Comment Period**

Joan Konrad (RAB member) read a personal statement aloud, “Since we have three new members, I thought it would be a good idea possibly for the RAB community members to get together and have a meeting to review our goals and discuss the possibility of improving our effectiveness. There has been little interest in that. I would however like to offer kudos, first of all to the members of the RAB who want this process to result in the highest possible cleanup. The Navy has been allotted limited funds to finance it, and it seems to me they work hard to create a process that provides the highest quality standards. EPA, the DTSC, and the Water Board are charged with negotiating with the Navy to ensure that this is done. They are our

community's and the City's negotiators. The City of course wants the base cleaned up because they've been waiting a long time to redevelop. The community members, all of us, want the same thing, cleanup to the highest standard. There is no doubt in my mind the way to accomplish this is to understand we all want the same thing, and the best way to achieve it is to work together in the spirit of cooperation and I hope we can."

George Humphreys (RAB member) asked about the status of Jeff Knoth, formerly listed as a RAB member, and whether formal action, such as a RAB vote, had been taken to remove Mr. Knoth from the RAB. He said Mr. Knoth was included as a representative from the Alameda Unified School District (AUSD). Since Mr. Knoth is no longer included on the list, he requested the Navy invite someone as a representative from the AUSD. Mr. Humphreys said because Encinal High School is close to the Alameda Point, it is important to keep the AUSD informed. Mr. Robinson said he will review Mr. Knoth's status, and can extend an invitation for someone from AUSD to attend the RAB meetings. Daniel Hoy (RAB member) said he will provide Mr. Robinson with contact information for a facilities manager at the AUSD. John West (Regional Water Board) said he would contact Mr. Knoth regarding his status.

## **II. Co-Chair Announcements**

Ms. Smith provided a copy of a former Mare Island Naval Shipyard (MINS) progress report that discusses reuse of a building that is similar in size to Alameda Point's Building 5. She said the building is being considered for reuse by companies specializing in wind turbine manufacturing, solar panel manufacturing, and large steel fabrication, and it is good to see them moving forward with reuse. Ms. Smith noted that former Naval Station Treasure Island will likely transfer next year.

Ms. Smith presented one comment letter regarding the Second Revised Draft, Operable Unit (OU)-2B Feasibility Study, on behalf of the RAB. Ms. Konrad submitted a comment letter of her own ([Attachment B-1](#); [Attachment B-2](#)). She requested a copy of the response to the comments once they are prepared so that she may review the responses. Ms. Smith said the OU-2C Feasibility Study was finalized and included cost estimates for cleaning up Buildings 5 and 5A based on RAB comments, although the investigation area was not expanded.

Mr. Robinson presented the list of upcoming documents and scheduled field activities ([Attachment B-3](#)). He said dredging was completed in May in the northeastern corner of Installation Restoration (IR) Site 17. Dredging is expected to be completed in the northwest corner by 2012, after funding is acquired and a new contract is in place. He said a remedial action and excavations are ongoing at IR Site 35. He said radiological scanning and sampling is ongoing at IR Site 32 and results will be provided as they become available. The sampling and scanning will be useful in determining the IR Site 32 boundary. He said at OU-2B, in IR Site 21, a six-phase heating pilot test has begun in the source area closest to the San Francisco Bay (Bay) (the wishbone-shaped plume).

Mr. Robinson said that there will not be a July RAB meeting, due to the holiday week. However, there will be a tour on Saturday, July 16. He said the four planned tour stops include: (1) OU-2B six-phase heating at IR Site 21; (2) IR Site 1; (3) IR Site 17 Seaplane Lagoon, where dredging has stopped but other activities are ongoing; and (4) Building 5. Mr. Robinson said the tour could include riding in the bus a short distance up the berm surrounding IR Site 2 for a view over the site from the bus. However, this is only possible if it is not raining, and the tour participants will not be able to exit the bus. He asked the RAB to vote whether they want to ride the bus onto IR Site 2. The RAB agreed that the site should be included on the tour.

### **III. IR Site 1 Landfill; Groundwater Remedial Action**

Mr. Robinson introduced Cecily Sabedra (Navy RPM) to provide an update on groundwater remedial action at IR Site 1 ([Attachment B-4](#)). He said there is a Record of Decision (ROD) Amendment planned for the IR Site 1 soil remedial action, and the Navy has elected to proceed with the groundwater remedial action rather than wait for the ROD Amendment to be completed.

Ms. Sabedra said the draft groundwater remedial design/remedial action work plan for IR Site 1 is due in July and there will be a 60-day review period.

During the review of slide 7, Richard Bangert (RAB member) asked what a multilevel piezometer is. Ms. Sabedra explained it is similar to a groundwater monitoring well, in that a boring is advanced and a sleeve with screened intervals is inserted. She said the piezometers are usually used to differentiate pressure. Ms. Smith asked if the piezometers are part of the quarterly groundwater monitoring program. Ms. Sabedra said they are not; they had been installed for a previous investigation and were used during the pre-design characterization study.

During the review of slide 11, Ms. Smith asked if piezometer PZ 11 is past the funnel-and-gate system. Ms. Sabedra said it is right in front of the funnel-and-gate system. Ms. Smith said the figure shows that at 8 feet below ground surface (bgs) the concentration is 40,108 parts per billion (ppb), while at the source area the concentration is 7,517 ppb. Ms. Sabedra said the concentrations represent the total halogenated volatile organic compounds (VOC), including different organic compounds which may account for the difference in the mass total. Mr. Humphreys said the concentration appears to increase at 10 feet bgs where it is 77,530 ppb. Mrs. Sweeney said it seems to get more concentrated the deeper it goes.

Turning back to slide 7, Mr. Humphreys asked if the funnel-and-gate system is open at the box. Ms. Sabedra said it is open and water does flow through the gate. Mr. Humphreys asked if there is any flow in the transect marked "A/A" which appears to go through the wall of the funnel-and-gate system. Ms. Sabedra said it is possible the funnel and gate does not completely contain the groundwater and some flows around the sides of the funnel and gate. Mr. Humphreys asked how deep the sheet piling for the funnel-and-gate system extends. Ms. Sabedra estimated 12 feet bgs, but was unsure. She said the funnel-and-gate system was installed in the early 1990s in conjunction with treating the groundwater with zero-valent iron that was reported to be

successful. Ms. Smith asked if the funnel-and-gate media needs to be replaced, based on information that such a system should be refreshed every seven years as part of operation and maintenance. Ms. Sabedra said if the funnel-and-gate system was part of the final remedy it would be replaced, but it is considered an interim remedy. Mrs. Sweeney recalled seeing a plume map that included part of the plume going through the funnel-and-gate system, while another part of the plume makes a wide swing out around it. She asked if there are enough wells to test the portion of the plume that swings out around the funnel and gate. Ms. Sabedra said there is a well in place as part of the basewide groundwater monitoring program for monitoring the western edge of the plume. Ms. Sabedra said the monitoring well is MW0-28B and pointed out the approximate location on the figure.

Turning back to slide 3, Mr. Humphreys said at one time the plume had originated from one of the 5 or 6 disposal cells. Later, it was said to have originated from the corner of some industrial building, which is now referred to as an historical waste area. He asked how confident the Navy is about the source. Ms. Sabedra said based on the data, the potential source area has likely been identified. She stated it is difficult to know the exact source, but the data can be interpreted. Mrs. Sweeney asked what is considered to be the source of the plume. Ms. Sabedra said based on historical information there is an area referred to as a waste pit, shown on the historical photograph on slide 3. Ms. Smith asked if the historical waste area contained 55-gallon drums that had not been punctured. Ms. Sabedra said at this time it is unclear if there were drums or if the waste was just disposed of in the area.

During the review of slide 12, Mr. Humphreys asked why the operator is wearing a respirator. Ms. Sabedra said the respirator is protecting the operator from oxidizing compounds for the in-situ chemical oxidation (ISCO) treatment that is being mixed in the tanks, consisting of hydrogen peroxide and persulfate.

During the review of slide 13, James Leach (RAB member) asked what three oxidant types were evaluated during the bench test. Ms. Sabedra said the three oxidants tested were: (1) alkaline-activated sodium persulfate (A-ASP), (2) d-Limonene-enhanced alkaline-activated sodium persulfate (D-A-ASP), and (3) catalyzed hydrogen peroxide-activated sodium persulfate (CHP-ASP), which is the one that performed best.

Fred Hoffman (community member) asked what were the concentrations of contaminants used in the bench test. Ms. Sabedra said groundwater from the source area was used, where the maximum concentration was around 400,000 ppb for total VOCs. Mr. Hoffman said concentrations in that range are commonly indicative of “pure product” and asked if the bench test had been tried on pure product. Ms. Sabedra said product was not found at the site. Mr. Hoffman asked if that affected bench testing. Ms. Sabedra said the preferred product was designed to address potential “pure product”. Mr. Leach asked if the bench test was being conducted in the ground or in tanks. Ms. Sabedra said it was conducted in the ground. Mrs. Sweeney said once the highest concentrations are treated, the next phase seems like it will be natural attenuation into the Bay. Ms. Sabedra said there are performance goals, and there are plans for up to three rounds of treatment.

Mr. Leach asked how one “round” of treatment is defined. Ms. Sabedra said it is not easy to define a “round” because higher concentration and lower concentration areas will be treated differently. Mr. Robinson said that information will be included in the draft remedial design document, which will be issued next month. Mr. Leach said he would define one round as when the total volume of liquid in the aquifer goes through one exchange cycle, because you are re-injecting the cleaned-up water. Ms. Sabedra said yes, they will be extracting and injecting at the same time.

During the review of slide 15, Mr. Hoffman asked what are the concentrations of the VOC plume lines shown. Ms. Sabedra said that information will be in the design document. She said the lines represent the lateral extent of the various VOCs considered for treatment. Carol Gottstein (RAB member) said the concentrations do not just disappear at the edges of the lines; there must be a limiting concentration. Ms. Sabedra said the figure was a conceptual drawing with the intent to show the target treatment area.

Mrs. Sweeney asked if the source area was ever part of any of the trenching investigations. Ms. Sabedra said no, the pre-design characterization did not trench in that area, and she does not believe there were trenches in the area during prior investigations.

Mr. Humphreys said at one time there was a representation made that there was dense non-aqueous phase liquid (DNAPL) in the plume. He asked if there is DNAPL now. Ms. Sabedra said that direct evidence of DNAPL was not observed during the recent sampling event. In the late 1990s it was reported that light non-aqueous phase liquid (LNAPL) was detected in one or two wells, which has not been reported since. She said if product is found during a well installation for the treatment system, it will be removed. Mr. Robinson asked if the more recent investigation was looking for LNAPL. Ms. Sabedra said they were looking for LNAPL but did not find any.

Ms. Smith asked if the funnel-and-gate system was to the east of the road. Mr. Humphreys confirmed it was always to the west of the road. Ms. Smith said she had seen old plume maps with a boomerang-shaped plume and asked if tidal action took care of the problem. Ms. Sabedra said that was the model for the plume before the pre-design characterization study was completed. She said the additional data support the current plume shapes. Mr. Hoffman said based on what is presented here, there is insufficient information to determine what the plume looks like today. Ms. Sabedra said the detailed information will be in the design document. Mr. Hoffman asked what the definition of “plume” is for this project. Mr. Robinson said the lines on the figure are to demonstrate the area to be treated. The concentration contours will be presented in the upcoming remedial design document. The goal this evening is to provide information to help in the review of the document. Mr. Hoffman said it appears that the Navy believes this plume is only 20 to 30 feet wide, and is basing that on a single well that is not identified on any of the maps in the presentation. Mr. Hoffman asked how it can be stated that the plume has not reached the Bay, using results from quarterly sampling over the years in wells that are hundreds of meters apart, without presenting data on any of the figures. Mr. Robinson said the Navy will distribute a concentration map to the RAB as soon as it is created. Dr. Gottstein said a map with

a lot of concentrations does not answer the question of what number was used to create the lines on the figure, and that is the number she is interested in knowing. Mr. Robinson said that information can be included as well. Mrs. Sweeney said there is a lot of information that can be included on a map such as the concentrations, and the depth of the concentrations as well.

Mr. Humphreys said the plume is shown ending at the funnel-and-gate system; however, there are a number of wells to the west of the funnel-and-gate system. He asked if samples were collected from those wells to the west of the funnel and gate. Ms. Sabedra said monitoring well M028-E was sampled and there were direct-push samples collected to the south. Ms. Smith said there are a number of monitoring wells to the west, but she recalls they are damaged and only one monitoring well, MW0-28B, near the rip rap is being used. She noted that wells may be tidally influenced, which would dilute the samples. Mrs. Sweeney asked if the plume outline is based on data from only one well. Mr. Robinson said samples were also collected from piezometers.

During the review of slide 16, Mr. Humphreys asked if the soil remedy will be put in place after the start of the groundwater remedy. Ms. Sabedra said that is correct. Ms. Smith asked if the soil remedy will also include anchoring the slope to prevent slumping in the event of a maximum credible earthquake. Ms. Sabedra said that is part of the soil remedy. Mr. Robinson clarified that the groundwater remedy will begin in November 2011, but may not be complete by the time the soil remedy begins. Ms. Sabedra added it is possible the ISCO treatment may be complete when the soil remedy begins, although groundwater monitoring is ongoing. Ms. Smith asked if monitoring will continue for 36 years. Ms. Sabedra said the length of monitoring is not known at this time. Mr. Bangert asked if the monitoring wells used for long-term monitoring will interfere with recreational use of the site, such as having exposed pipes. Ms. Sabedra said wells will be installed throughout the landfill area as part of the long-term monitoring plan, and they can be flush so as to not interfere with recreational use.

Mrs. Sweeney asked if the heat created using hydrogen peroxide persulfate is the same temperature as the heat used in the six-phase heat treatment technology. Ms. Sabedra said it is not, it is a much lower temperature increase that encourages microbial activity. Mrs. Sweeney asked if the activity will volatilize metals in the ground. Ms. Sabedra said the chemistry of some constituents beneath the ground surface may change, such as iron.

Mr. Hoy asked if the final design of the groundwater remedy will include the funnel-and-gate system currently in place. Ms. Sabedra said the funnel-and-gate system will be left in place if it does not hinder the current remedy.

Mr. Leach asked if biological treatment is being considered at this time as a possible remedy. He noted if chemical treatment is used it could effectively kill any biological treatment also being used. He asked if the treatment is supposed to restore the site to the same conditions as before it was contaminated, and if that will be discussed in the final report. Ms. Sabedra said the

treatment does change some of the chemical make-up below ground surface, but the aquifer is expected to naturally recover from ISCO chemical upset.

#### IV. BCT Update

Mr. West provided the Base Realignment and Closure [BRAC] Cleanup Team (BCT) Update. He provided a follow-up to the action item about who is responsible for posting fish advisories. He said he spoke with Karen Taberski (Regional Monitoring Coordinator, San Francisco Bay Water Board), and the Office of Environmental Health Hazard Assessment (OEHHA) about what is the responsibility of the city of Alameda (City) to post signs warning about consumption of fish near Seaplane Lagoon. He said there is no legal responsibility at either the City, County or State level to post such signs. He said there is a voluntary collaboration between California Department of Public Health (CDPH), California Department of Fish and Game (CDFG), the City of San Francisco and the San Francisco Bay Fish Project to post signs. He provided an OEHHA document “Consumption of Fish and Shellfish in California and the United States” ([Attachment B-5](#)).

Ms. Smith said she would like the BCT updates to include more information about what is discussed at BCT meetings. Mr. Robinson said the BCT meetings discuss what is topical at the time, focusing on the documents that are being reviewed. Ms. Smith said she is interested in hearing what the regulators are concerned about, and what issues they may have versus what the Navy is proposing. Mr. West said he will provide an update of what is discussed at the BCT meeting and highlight the topics.

#### V. Approval of May 5, 2011, RAB Meeting Minutes

Ms. Smith asked for comments on the May 5, 2011, RAB meeting minutes.

Mr. Humphreys provided the following comments:

- Page 3, fifth paragraph, last sentence remove “diagonal” and add “slanted down under the buildings”, so it will read: “Therefore, that vapor barrier will have to be relied upon forever unless **lines are slanted down under the buildings** to treat that area.”
- Page 8, fourth paragraph, last sentence, please define the acronym “SERDP”. The acronym will now be spelled out: Strategic Environmental Research and Development Program (SERDP).

Ms. Smith provided the following comments:

- Page 3, seventh paragraph, fifth sentence, change “it is” to “they are” so it will read: “Ms. Smith said as RAB Co-chair she needs to receive all the materials the RAB members are receiving to ensure that **they are** in the proper format and accessible.”
- Page 4, first paragraph, fourth sentence add the word “have” so it will read, “Mr. Robinson said the petroleum program has been characterizing petroleum sites, and it is likely those **have** been characterized, but he would have to confirm that.”
- Page 5, first paragraph, last sentence, change “lead” to “led”, so it will read: “Curtis Moss (Navy PM) led the roundtable discussion of the OU-2B second revised draft feasibility study report ...”
- Page 6, third full paragraph, second sentence: “Mr. Moss said, there was a successful removal action in the area of Plume 4-2 as shown by the “c” type shape of the source area.” It will now read: “Mr. Moss said there was a successful removal action in the area of Plume 4-2 as shown by the “c” shape in the source area.”
- Page 9, second bullet, second sentence, remove “Based on a suggestion from Ms. Smith...” So it will read: “Dr. Russell said the text should be revised to...”
- Page 10, first full paragraph, correct the spelling of “Teitrick” to “Tetirick”.

Dr. Gottstein provided the following comment:

- Page 10, second indented paragraph, second sentence, change “Berry’s” to “Beery’s”, so it will read: “Barry’s should be spelled Beery’s.”

The May 5, 2011, RAB meeting minutes were approved with the above requested modifications.

## **VI. Review Action Items**

The status of previous action items was reviewed and is provided in the updated table below.

Ms. Smith handed two pages from a report that includes information about a historical radiological shipment that arrived to Alameda Point via rail. The report says the shipment was in poor shape, and materials were spilling out of the rail car. She asked Mr. Robinson for additional details. Mr. Robinson said he will ask the Navy’s Radiological Affairs Support Office (RASO) and provide an update of any further information.

The meeting was adjourned at 8:30 PM. There will be no RAB meeting in July, but the tour is scheduled for July 16, from 9:00 a.m. to 11:00 a.m. The next RAB meeting will be held at 6:30 pm on Thursday August 4, 2011, at 950 West Mall Square, Alameda.

### Action Items

Items grayed out have been completed at or since the May RAB meeting.

<b>Action Items:</b>	<b>Previous Item #/ Action Item Status/ Action Item Due Date:</b>	<b>Initiated by:</b>	<b>Responsible Person:</b>
1. Request for Presentations: a. Site 25 Plume Status Tracking b. OU-2C, Building 5/5A Demolition Costs and Feasibility Postponed Presentations (pending further action or information prior to scheduling the presentation): 1. Site 1 Radiological RD/RA work plan.	a./ Pending / 2011  b./ Pending / 2011	RAB	Mr. Robinson
2. Mr. Fyfe and Mr. West will check on responsibility of City of Alameda to post signs warning about consumption of fish near Seaplane Lagoon.	6/Completed/ June 2, 2011	Dr. Gottstein	Mr. Fyfe, Mr. West
3. Mr. Russell will provide 15 copies of the 11x17 diagram of the fuel lines along the north side of Seaplane Lagoon.	Completed/June 2, 2011	Dr. Gottstein	Dr. Russell
4. Mr. West will contact Jeff Knoth to determine if he would like to continue being on the RAB, or can suggest a replacement from the AUSD.	New/June 16, 2011	Mr. Humphreys	Mr. West
5. Navy will provide written responses to RAB members on comments submitted for the OU-2B Feasibility Study Report.	New/August 4, 2011	Ms. Smith	Mr. Robinson

<b>Action Items:</b>	<b>Previous Item #/ Action Item Status/ Action Item Due Date:</b>	<b>Initiated by:</b>	<b>Responsible Person:</b>
6. Navy will have their contractor prepare a map showing concentrations used to draw the plume boundaries and a map showing all sample locations and their concentrations.	New/ July 31, 2011	Dr. Gottstein	Mr. Robinson
7. Mr. Robinson will ask RASO for any additional documentation regarding potential radiological material coming on base by rail shipment and provide an update to the RAB.	New/August 4, 2011	Ms. Smith	Mr. Robinson

## **ATTACHMENTS**

### **NAVAL AIR STATION ALAMEDA RESTORATION ADVISORY BOARD MEETING ATTACHMENTS**

- A Naval Air Station Alameda Restoration Advisory Board Meeting Agenda, June 2, 2011, (1 page)
- B-1 RAB comment letter on 2<sup>nd</sup> Revised Draft, Feasibility Study Report, OU-2B
- B-2 Letter from Joan Konrad regarding 2<sup>nd</sup> Revised Draft, Feasibility Study Report, OU-2B.
- B-3 Recent and upcoming deliverables and fieldwork schedule (2 pages)
- B-4 Installation Restoration Site 1 Groundwater Remedial Action (17 slides)
- B-5 OEHHA document “Consumption of Fish and Shellfish in California and the United States” (13 pages)

# ***RESTORATION ADVISORY BOARD***

***NAVAL AIR STATION, ALAMEDA***

## ***AGENDA***

**JUNE 2, 2011, 6:30 PM**

**ALAMEDA POINT – BUILDING 1 – SUITE 140  
COMMUNITY CONFERENCE ROOM  
(FROM PARKING LOT ON W MIDWAY AVE, ENTER THROUGH MIDDLE WING)**

<b><u>TIME</u></b>	<b><u>SUBJECT</u></b>	<b><u>PRESENTER</u></b>
<b>6:30 – 6:35</b>	<b>Welcome and Introductions</b>	<b>Community and RAB</b>
<b>6:35 – 6:50</b>	<b>Community and RAB Comment Period*</b>	<b>Community and RAB</b>
<b>6:50 – 7:05</b>	<b>Co-Chair Announcements</b>	<b>Co-Chairs</b>
<b>7:05 – 8:05</b>	<b>Site 1 Landfill; Groundwater Remedial Action</b>	<b>Cecily Sabedra</b>
<b>8:05 – 8:15</b>	<b>BCT Update</b>	
<b>8:15 – 8:30</b>	<b>Approval of Minutes Review Action Items</b>	<b>Dale Smith</b>
<b>8:30</b>	<b>RAB Meeting Adjournment</b>	

\* If there is time at the end of the agenda, additional comments will be taken.

# NAVAL AIR STATION ALAMEDA RESTORATION ADVISORY BOARD

Attachment B-1  
(3 pages)

Mr. Derek Robinson  
Department of the Navy  
Base Realignment and Closure, Program Management Office West  
1455 Frazee Road  
San Diego 92108

June 2, 2011

Re: Revised Draft Revision 2 Feasibility Study OU-2B IR Sites 3, 4, 11 and 21

Dear Mr. Robinson,

Thank you for the opportunity to comment on the above document and on the presentation to the Restoration Advisory Board (RAB) on May 5, 2011. This letter presents both general and specific comments we wish to be considered by the Navy and its consultants.

## General Comments

The RAB commends the Navy for its commitment to clean up soil contamination to residential standards and to remediate groundwater contamination to drinking water standards. This provides strong evidence of the Navy's dedication to cleaning up base contamination and reducing public and environmental exposures.

The alternatives presented in the report and at the RAB meeting are not sufficiently defined to provide a clear indication of their relative merits. We appreciate the desire for flexibility in future design; however, it prevents a clear understanding of the alternatives' efficacy and cost and leads to proposed plans that have serious flaws. As the Navy places great emphasis on costs this flexibility results in a misrepresentation of true costs.

The upper range of times for cleanup of the groundwater contamination (36 and 48 years) is unacceptable to the RAB and the community. Comparing these times with the upper value for the no action alternative (67 years) indicates excessive reliance on natural attenuation with only the inclusion of monitoring. The primary mechanism for natural attenuation appears to be dilution by continued releases into Seaplane Lagoon. We feel that more aggressive steps must be taken to speed cleanup of the entire groundwater plume and reduce releases.

The various presentations to the RAB have not adequately shown the vertical extent of the groundwater contamination. This information is important to understand the difficulty of remediating the deep (60 to 70 feet below ground surface) source areas of dense nonaqueous phase liquids (DNAPLs) and the likely flow of groundwater contamination under the sea wall into Seaplane Lagoon. The soil stratigraphy of clays, sand and debris from historical industries was not discussed. This information will influence the practical aspects of drilling wells, cutting trenches and injecting various reagents into the soil, especially in Site 4.

The Navy needs to adopt a more holistic approach and consider the interactions among the various types of contamination (soil, groundwater and vapor) and among the various cleanup programs (CERCLA and the petroleum program). Various groundwater treatment reagents may mobilize metals in the soil and residual petroleum may interfere with and consume reagents used for in-situ chemical oxidation. It is also unclear how the various pilot tests will be integrated into the whole cleanup plan and whether the costs are included in the totals. Will some of the pilot tests, such as nano-zero valent iron, interfere with or preclude the use of electrical heating in those areas?

# NAVAL AIR STATION ALAMEDA RAB

## Specific Comments

### Soils

Whatever groundwater alternative is chosen, the RAB prefers Alternative 2, the excavation of soil contamination (primarily metals) to above residential standards and offsite disposal.

### Groundwater

#### Zero Valent Iron (ZVI)

Zero valent iron may not be effective in reducing vinyl chloride. The pilot test with nano ZVI was unsuccessful because the slurry could not penetrate the clay formation and larger iron particles may be even harder to inject. Residual iron may affect water quality and potability as high iron water has an offensive taste and may cause corrosion and deposits in piping. After stripping the chlorine atoms from chlorinated volatile organic compounds (VOCs), some other process, such as biosparging, may be needed to remove the unchlorinated hydrocarbons produced by the reaction.

#### In-situ Chemical Oxidation (ISCO)

The oxidative reagents used for ISCO may mobilize toxic metals in the soil. Therefore, this process should not be used in areas with metallic contamination or metals contaminated soils should be removed first.

#### Permeable Reactive Barrier (PRB)

The descriptions of this approach in Alternatives G-2 and G-4 are unclear and confusing. Figures 43 and 46 show flow outward from the PRB; during the presentation it was described as sucking or drawing groundwater toward the barrier. There was even a suggestion that the barrier is passive. If groundwater is drawn into the barrier, where would the treated water be discharged? The injection wells shown in figure 46 or Alternative G-4 seem to use a groundwater recirculation process. If water is being drawn into the barrier, the depth from which the suction is taken could be limited. The vertical depth at which suction is taken would have to be controlled; otherwise with an open permeable surface, groundwater would be drawn preferentially from the upper levels. There do seem to be several kinds of PRBs and they seem to be operator dependent. The Navy needs to be much more specific about the details of the proposed PRB, since there are so many kinds and the results achieved at Sunnyvale and Moffitt Field are impressive.<sup>1</sup> Consideration must be given to the necessity to periodically change the reagent if a passive system is installed.

#### Recirculation

As shown in figure 46 it appears that treated water from the central injection wells would be drawn into the nearby central extraction wells.

#### Toxic Metals

Remediation of the area of groundwater contamination (lead, mercury, arsenic and chromium) shown near the seawall in presentation slide 13 should be accomplished as part of the overall cleanup program.

#### Preferred Alternative

The RAB prefers an alternative that entails in-situ thermal treatment of source zones and shallow groundwater treatment using in situ chemical reduction with enhanced dehalococoides followed by biosparging after all metal contaminated soil is removed. We assume the source zones include deep sources of DNAPLs. It is unclear why the maximum cleanup time is 36 years. The biosparging array should cover the entire plume and include areas under buildings and infrastructure. Feasible widespread areas of deep groundwater contamination (outside of source zones) also should be actively treated to reduce clean-up time. Not removing deep groundwater contamination could lead to recontamination of the shallow groundwater.

In summary we have the following questions

Why is the maximum cleanup time 36 years under G-3b?

Will the source zones include deep sources of DNAPLs?

# NAVAL AIR STATION ALAMEDA RAB

Will the biosparging array cover the entire plume and include areas under buildings and infrastructure?  
Will remediation of the area of groundwater contamination (lead, mercury, arsenic and chromium) shown near the seawall in presentation slide 13 be accomplished as part of the overall cleanup program?  
Will ISCO be used in areas with metallic contamination? We believe it should not because the oxidative reagents used in treatment may mobilize toxic metals. Metals contaminated soils should be removed first.  
How will the various pilot tests be integrated into the whole cleanup plan and will the costs be included in the totals?  
Will some of the pilot tests, such as nano-zero valent iron, interfere or preclude the use of electrical heating in those areas?

Again, thank you for the opportunity to comment on this document.

Yours



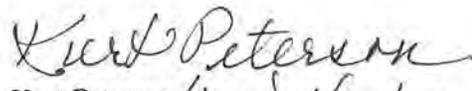
Dale Smith, Community Co-chair



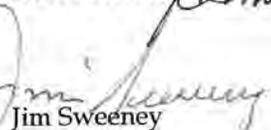
Richard Bangert



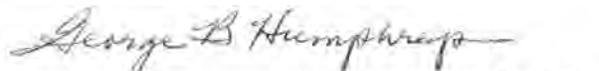
Daniel Hoy



Kurt Peterson



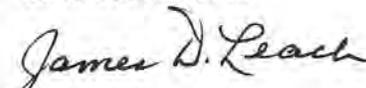
Jim Sweeney



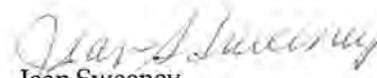
George Humphreys, Vice Community Co-chair



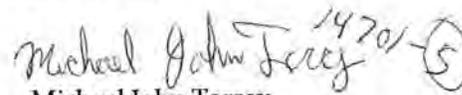
Carol Gottstein, MD



Jim Leach



Jean Sweeney



Michael John Torrey

Copies: Councilmembers Johnson and deHaan  
Peter Russell, Russell + Associates  
Xuan-Mai Tran, US EPA  
James Fyfe, Cal EPA DTSC  
Michelle Dalrymple, Cal EPA DTSC  
Jim Polisini, Cal EPA DTSC  
John West, SF RWQCB

Endnotes:

<sup>1</sup> Reeter, C.; Gavaskar, A.; Sass, B.; Gupta, N.; Hicks, J. (1998) Performance Evaluation of a Pilot-Scale Permeable Reactive Barrier at Former Naval Air Station Moffett Field, Mountain View, California: Volume 1.

Joan Konrad  
42 Invincible Court  
Alameda, California 94501  
510-522-3789

June 2, 2011

Mr. Derek Robinson  
Department of the Navy Base Realignment and Closure  
Program Management Office West  
1455 Frazee Road  
San Diego 92108-4310

Dear Derek:

Would you please respond to the issues investigated by Dale Smith and George Humphreys and presented to you in the letter of May 20, 2011 by answering the concerns in written form? I feel obliged not to sign the letter because I do not have sufficient technical knowledge to know if the statements made are correct.

Sincerely,



Joan Konrad  
Community Member, Naval Air Station Alameda, Restoration Advisory Board

Copies: Councilmember Doug deHaan  
Peter Russell, Russell + Associates  
Melinda Garvey, US EPA  
James Fyfe, Cal DTSC  
John West, SF RWQCB

**Recent and Upcoming Deliverables, May 17, 2011  
Alameda Point, Alameda, CA**

<b>Recent</b>		
<b>Site</b>	<b>Document</b>	<b>Transmittal Date</b>
OU-2B	Draft FS Revision 2	4/6/2011
OU-2C	Final FS Report	5/10/2011

<b>Upcoming</b>		
<b>Site</b>	<b>Document</b>	<b>Transmittal Date</b>
OU2A	Final FS Report	6/3/2011
OU2A	Proposed Plan	6/17/2011
Basewide	Revised Draft CERCLA 5 Year Review	6/22/2011
Site 24	Draft Remedial Design and Remedial Action Work Plan	7/11/2011
OU-2C	Draft Storm Drain FS Addendum	7/29/2011

**Active and Upcoming Fieldwork, May 17, 2011**  
**Alameda Point, Alameda, CA**

<b>Sites</b>	<b>Start</b>	<b>End*</b>	<b>Description of Fieldwork</b>	<b>RPM</b>
Basewide GW	5/1/2011	5/21/2011	Spring Sampling Event	JL
Site 4	4/1/2011	5/31/2011	Plume 4-1 TS DNAPL/Hydrogeological assessment: Enhanced Dissolution Test/ tracer tests	CM
OU-1	5/1/2011	5/31/2011	Performance Groundwater Monitoring IR Sites 6 and 16, OU-1	DD
Site 35 RA	4/18/2011	6/2/2011	Pre-excavation sampling, site excavation, verification sampling, site restoration, and associated field activities	FF
Site 24	5/8/2011	6/8/2011	Pre-design sampling	LB
Site 32	5/2/2011	6/15/2011	Radiological Characterization Survey and Sampling	CS
Site 17 Remediation	9/13/2010	12/31/2011 (NE Area sediments)	Dredging began in January 2011. The dredging of the Northeast Remediation Area was completed on May 7, 2011. The dredging of the former debris piles area was completed on May 12, 2011. The dredging of the Northwest Remediation Area is planned to be conducted between September 2011 and March 15, 2012.	MP
Site 21 (OU-2B)	1/1/2011	2/1/2012	Currently installing power lines, assembling equipment, driving sheet piles for six phase heating	CM
OU-5/FISCA IR02 Remediation	10/6/2008	10/6/2012	Biosparge / vapor extraction system Eastern Biosparge Area construction completed May 2009; Marina Village Western Biosparge Area biosparge area construction completed 10/6/2009. Treatment system running well. Calculated mass reduction of 2,822 pounds of benzene and 69,961 pounds of naphthalene after ~1 year of operation for the Eastern Biosparge Area. Variable frequency drives contributing to efficiency.	MP

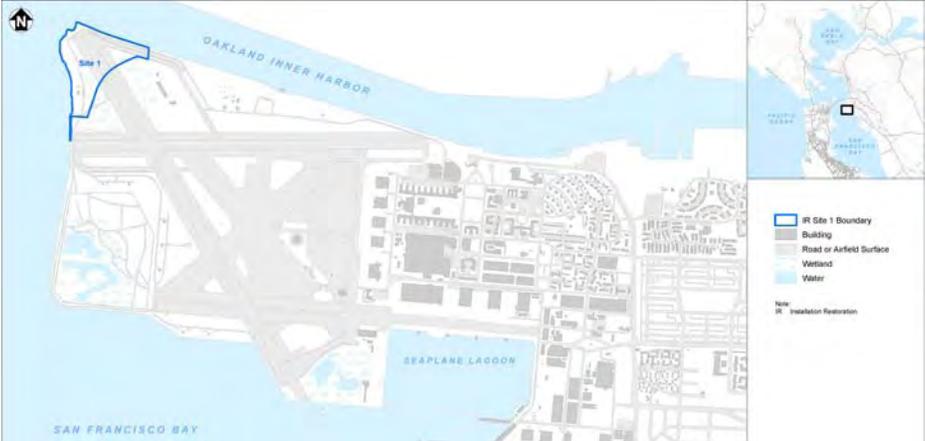
\* Ordered by End Date

 **Installation Restoration Site 1  
Groundwater Remedial Action** 



Cecily Sabedra  
Remedial Project Manager

 **IR Site 1 Location** 



IR Site 1 Boundary  
Building  
Road or Airfield Surface  
Wetlands  
Water

Note:  
IR Installation Restoration

2



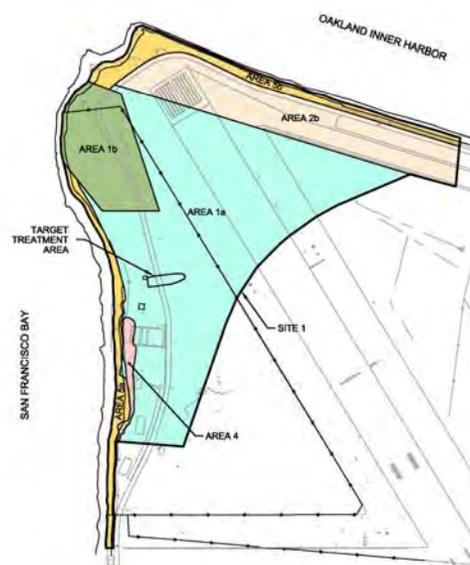
## IR Site 1 History



Principal disposal area for former Naval Air Station Alameda between 1943 and 1956



## Groundwater VOC Plume





## VOC Plume Selected Remedy



- In-situ chemical oxidation (ISCO)
- Monitored natural attenuation (MNA)
- Institutional controls
- Groundwater monitoring outside the VOC plume

5



## Implementation Strategy



- STEP 1: Pre-design characterization to identify high-concentration zones for treatment
- STEP 2: Design (includes bench test and installing injection and monitoring wells for field pilot testing)
- STEP 3: Full scale implementation and performance monitoring

6



# Exploration Boring Locations



# MIP Tool





## Direct Push Groundwater Sampling



9



## Site Investigation Findings

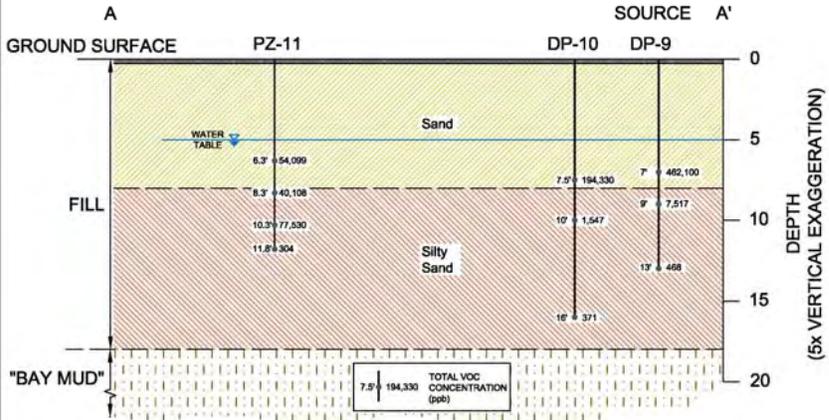


- UVOST borings found residual (laterally) petroleum hydrocarbon impacts, greatest thickness at former waste pit.
- Total VOC concentrations are larger in source area and diminish downgradient
  - Approximately 450,000 parts per billion in source area
  - Approximately 40,000 to 80,000 ppb near funnel and gate
- VOC Plume is thin and narrow:
  - Significant impacts restricted to depths of 5 to 10 feet
  - Width approximately 30 feet

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# Concentration Cross Section



# Pilot Test Injections





## ISCO Bench and Pilot Studies



- Bench test set up to address potential high-concentration residual contamination
- Bench testing evaluated three oxidant types -> catalyzed hydrogen peroxide-activated sodium persulfate (CHP-ASP) performed best
- Pilot study confirmed ability to achieve effective distribution and oxidizing conditions

13



## ISCO Treatment Approach



- Install injection wells, extraction wells, and monitoring wells
- Use ISCO to address VOCs
- Use of injection and extraction wells together:
  - Improves oxidant distribution
  - Minimizes plume displacement
  - Provides make-up water for treatment solution

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## Target Treatment Area



## Site 1 Remedial Action Timeline



November 2009	Record of Decision
November 2010	Pre-Design Characterization
July 2011	Draft Remedial Design/Remedial Action Work Plan for Groundwater
November 2011	Remedial Action for Groundwater Remedy
September 2012	Final ROD Amendment for Area 1b
May 2013	Remedial Action for Soil Areas



## Comments?



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Office of Environmental Health Hazard Assessment

FISH - Consumption in the United States

**Download Page**

September 19, 1997, Announcement of Public Workshop and Public Comment Period for the Draft Report Chemicals in Fish Report No. 1: Consumption of Fish and Shellfish in California and the United States [09/19/97]

For more information:

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Printed copies of this draft report may be purchased from Copies Unlimited, 5904 Sunset Blvd., Los Angeles, CA 90028, (213) 462-5532. The price is \$4.44 including tax for a loose-leaf, three-hole-punch copy, plus \$2.25 (approximately) for shipping and handling. For more information on binding options, mailing, and discounts for multiple copies, call Copies Unlimited. Free copies are available to government agencies by contacting OEHHA, PETS directly at (510) 540-3063. Also check the OEHHA Web site for publications at <http://www.oehha.org>.

Note:

The preface, table of contents and executive summary, of the Final Draft Report Consumption of Fish and Shellfish in California and the United States are available for on-screen viewing. The full text of the Final Draft Report may be downloaded as a 228 Kb Adobe Acrobat PDF file. [Follow this link to jump to the download area below.](#)

**ACKNOWLEDGMENTS**

This document is a result of the combined efforts of several staff members of the Pesticide and Environmental Toxicology Section of the Office of Environmental Health Hazard Assessment, as listed below. This report was developed from earlier draft versions prepared by Diana Lee, M.P.H., and Karen Kan, Ph.D.

**CONTRIBUTORS**

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Research Scientist

search

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[Fish Site Links](#)

[Advisories on Sport Fish Contamination in California](#)

[Advisory Information for Specific Water Bodies](#)

[Advice for Women of Childbearing Years and Children](#)

[Fish Consumption Advice in Languages Other than English](#)

[Guidance Tissue Levels and Screening Values for Contaminants in Sport Fish](#)

[Mercury in Fish](#)

[PCBs in Fish](#)

[Other Chemicals of Concern in Fish](#)

[Fish Consumption in California and US](#)

[Angler Survey](#)

[Reports and Notices](#)

[Fishy Links](#)

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This draft report should be cited as follows:  
Gassel M (1997). Chemicals in Fish Report No. 1: Consumption of Fish and Shellfish in California and the United States. Final Draft Report. Pesticide and Environmental Toxicology Section. Office of Environmental Health Hazard Assessment. California Environmental Protection Agency. Berkeley, CA.

#### PREFACE

This report represents the first in a series of documents that are being prepared by a technical team of staff in the Pesticide and Environmental Toxicology Section of the Office of Environmental Health Hazard Assessment (OEHHA). This series of guidance documents and reports is being developed to address questions and issues that continuously arise for scientists in agencies and programs which are charged with protecting human health and aquatic resources. Common issues pertain to chemical contaminants in fish and shellfish. The series will address these contaminants from a human health perspective, which is central to OEHHA's role of issuing sport fish consumption advisories for the State of California.

The designated lead scientist (author) for each report conducts the majority of the research and prepares the document with continuous input and review by other members of the team. The team consists of the following members: Robert K. Brodberg, Ph.D.; Joseph P. Brown, Ph.D.; Anna M. Fan, Ph.D.; Margy Gassel, Ph.D.; Gerald A. Pollock, Ph.D.; and Hanafi Russell.

OEHHA is a department of the California Environmental Protection Agency (Cal/EPA). Its charter is to support the agency's mission of improving environmental quality and protecting the public health, the welfare of our citizens, and California's natural resources. OEHHA provides scientific leadership consistent with the principles of sound risk assessment. OEHHA's responsibilities include:

Assessing health risks to the public from pesticide and other chemical contamination of food, seafood, drinking water, and consumer products, and developing health-protective exposure standards to recommend to regulatory departments; and

Making recommendations to the California Department of Fish and Game and the State Water Resources Control Board with respect to sport and commercial fishing in areas where fish may be contaminated.

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## I. EXECUTIVE SUMMARY

Human consumption of chemically contaminated fish and shellfish poses a potential health risk, the magnitude of which depends on the amount of fish consumed and the degree of contamination. Evaluation of the potential risks to populations that may be exposed to chemically contaminated fish and/or shellfish requires a knowledge of the patterns and rates of fish consumption by these populations. Additionally, fish consumption rates are used in the development of water quality criteria. Therefore, reliable estimates of fish consumption rates are essential to agencies and programs which have responsibilities in the protection of human health and aquatic resources.

In order to characterize human exposure to contaminated fish and shellfish, the potentially exposed population must be identified, and the likely types and quantities of fish and shellfish consumed must be determined. Historically, a variety of fish and shellfish consumption rates have been reported and used by different researchers and agencies. However, the consumption rates that have been determined may not be representative of local populations, and data which describe local consumption patterns and population characteristics for the population of concern may not be available or feasible to collect. Thus, exposure assessments often have to rely on rates reported in existing studies conducted in other regions and/or for other purposes. Estimates of consumption rates that describe fish and shellfish consumption for a particular population(s) of concern

must be derived from the most reliable studies and from those that are most applicable to the population(s) of interest.

When selecting the most appropriate estimates of fish and shellfish consumption, it is essential to identify the purpose and use of the estimated fish consumption rates. In order to characterize potential risks to public health from consuming contaminated fish and/or shellfish, consumption rates that apply to people who actually consume the fish and/or shellfish should be used. If consumption rates are to be used to develop water quality criteria, estimates which apply to the consumption of fish and/or shellfish from the water body of concern are appropriate. Per capita consumption rates derived for the general population (including nonconsumers) would not be appropriate for determining potential health risks to consumers from consumption of contaminated fish or shellfish and thus are not applicable to the development of water quality criteria for local water bodies. In addition, when fish consumption rates are to be used to conduct an exposure assessment for locally abundant pollutants only, consumption rates that apply to consumption of fish and/or shellfish from the affected water bodies should be used. In contrast, if the chemical(s) of concern is one with a more global distribution, such as methylmercury, then estimates of total fish consumption from all sources, including commercial and sport fish, are required to evaluate potential risks from exposure to this chemical via ingestion of fish and/or shellfish.

In this report, broad definitions of "fish and shellfish" will be used. The term "seafood" is considered here to include any edible organism from any water body. It generally is synonymous with the phrase "fish and shellfish" which is used throughout the report to denote any type of edible aquatic animal, excluding marine mammals. "Fish" includes any of various aquatic vertebrate animals having gills and commonly fins, including the bony fishes (those having bony skeletons) and more primitive forms with cartilaginous skeletons (such as sharks and rays). "Shellfish" includes any edible invertebrate animal usually belonging to one of the following taxonomic categories: 1) mollusks, including bivalves, gastropods, and cephalopods; 2) crustaceans; and 3) echinoderms. However, it should be noted that consistency among studies is lacking in terms of which types of seafood were actually included in the study. Therefore, estimates of consumption of fish and particularly shellfish across studies may not (and likely will not) include the same types of organisms.

Per capita consumption rates are estimates derived for the general population inclusive of both consumers and nonconsumers. Thus, per capita rates are primarily useful for trend analyses rather than representing actual consumption. Average per capita rates derived from national surveys for consumption of fish and shellfish by the general population ranged from 12 to 17.9 g/day. Several analyses of data used to estimate per capita consumption of fish and shellfish have found an increase of approximately 25 percent between 1970 and the early 1990's, indicating that the U.S. population as a whole consumed more fish in more recent years.

"Consumer only" consumption rates are preferable to per capita rates for use in describing actual consumption of fish and shellfish in the U.S. The only overall national mean rate currently published and applicable to all consumers of fish and shellfish combined is 48 g/day. This value may be a minimum

estimate as it does not include fish and shellfish in mixed dishes. Additionally, this value was derived from a study conducted nearly twenty years ago, in the mid-1970's. Unpublished results from a more recent national survey determined an estimated mean rate of 100 g/day for consumers of fish and/or shellfish including mixed dishes. However, data for "consumers only" from national surveys are limited because the reporting period typically covered only three days, and frequency of consumption was not determined. Therefore, the results may not characterize long-term consumption rates for consumers. Additionally, national studies that have been conducted thus far were not intended to address consumption of sport fish and shellfish. Thus, the results of these surveys are applicable mainly to consumption of commercial fish and shellfish and are not suitable for characterizing consumption by fishers or other consumers of sport fish and shellfish.

Regional studies of sport fishing populations reported overall mean rates for consumption of sport fish ranging from 12.3 to 63.2 g/day. These studies can be used to derive estimates of sport fish and shellfish consumption for populations in regions where geographic and population characteristics are similar, provided that the limitations of a given study are considered and a range or distribution of consumption rates is used (including at least the median, mean, and an upper percentile rate) to represent the population as a whole. The overall mean rates for total fish consumption calculated from the studies that targeted fishing populations (and reported on consumption of both sport and commercial fish and shellfish) ranged from 16.1 to 61.3 g/day. These studies indicated that sport fishers consumed commercially available species in addition to sport-caught fish and shellfish.

The United States Environmental Protection Agency (U.S. EPA) developed and has advocated a fish consumption rate of 6.5 g/day for the general population for consumption of fish and shellfish from estuarine and freshwaters. The 6.5 g/day default value has subsequently been adopted by other agencies and has been applied in innumerable instances inappropriately, without an adequate understanding of its derivation and applicability. Consequently, the widespread use of 6.5 g/day as a default value for fish consumption in general, and particularly for sport fishers, has been unjustified and inappropriate. The 6.5 g/day value was initially derived from data on fish and shellfish consumption obtained from a national survey conducted in the early 1970's. This estimate was based on consumption of nonmarine (freshwater and estuarine) species only, and was determined on a per capita basis although only about 14 percent of the U.S. population reported consumption of nonmarine fish in the survey. Additionally, the distinction between sport-caught and commercially purchased fish and shellfish was not maintained in the original compilation of data, and consumption rates for commercial and noncommercial fish and shellfish could not be differentiated. Therefore, the use of this per capita estimate as a default value to represent actual consumption by consumers of sport fish and/or to derive water quality criteria which are intended to protect consumers of fish obtained from these water bodies is indefensible.

Difficulties in defining and evaluating subsistence fishers have resulted in limited information pertaining to consumption rates for subsistence populations. A few distributional datasets are currently available for sport fishing populations believed to

represent or include subsistence fishers (e.g., Native Americans, some Asian populations, and low income urban populations). Use of an upper level intake rate (such as the 95th percentile) from these distributions in exposure assessments would encompass consumption rates for individuals reporting above-average consumption within these populations and may account for consumption by subsistence fishers. However, in locations where exceptionally high consumption by subsistence populations or other people is expected, obtaining data for the subpopulation of interest would be preferable.

Consumption rates can vary among subpopulations by race or ethnicity, age, sex, income, fishing mode, region of the country, and other demographic variables. A number of studies have demonstrated trends in higher rates of fish consumption for certain racial or ethnic subpopulations. These studies showed that fish consumption rates were higher for some Asian populations, Blacks, Native Americans, and other minority groups. Higher-consuming ethnic subpopulations and other high-end consumers are likely to be represented by upper percentile consumption rates (such as the 95th percentile) derived from a distributional analysis. Some studies also found differences in the patterns of fish consumption and fishing behavior among subpopulations.

Studies that differentiated fish consumption rates (in g/day) by age and sex showed that, generally, males consumed more than females, and the amount of fish consumed increased with age. In many cases, although not all, these differences are likely to correspond to differences in body weight. Exposure assessments should consider body weight as a parameter and use sex and age-specific consumption rates, when available, or adjust for differences in body weight when evaluating subsets of the population. Additionally, there is limited evidence that some elderly fishers consume fish and/or shellfish at rates that exceed (by two to three times) the average for adult sport fish consumers. In the absence of actual data, higher consuming subgroups are likely to be included within the upper percentile consumption rates derived from a distributional analysis.

The available data suggest that consumption rates for sport-caught marine and estuarine fish tend to be comparable to those for sport-caught freshwater fish. Additional data are needed to evaluate the potential for differences in consumption of fish obtained from water bodies in specific regions of the U.S. where variables such as access and availability of fish and/or shellfish may differ substantially.

The Santa Monica Bay Seafood Consumption Study provides the best available dataset for estimating consumption of sport fish and shellfish in California. Additionally, the distribution of consumption rates derived from the Santa Monica Bay dataset can be used as default values when locally specific data are not available (or appear to be inadequate). Consumption of sport fish by populations in California can be described by the consumption rates determined from this study of 21 g/day, 50 g/day, 107 g/day, and 161 g/day for the median, mean, 90th, and 95th percentile rates, respectively. These estimates of fish and shellfish consumption were derived from a study of fishers using a marine water body. However, the similarity between this dataset and that derived for fishers using freshwater bodies (in Michigan) suggests that these default values are applicable to sport fish consumers regardless of whether the fish and shellfish

were obtained from marine, estuarine, or freshwater sources.

Studies that specifically address consumption rates for commercial fish and shellfish in California are lacking, although several analyses of national data have indicated that people in the Pacific region consumed slightly more, on average (and per capita), than the overall U.S. population. Therefore, national estimates for consumers (particularly those derived from the most current studies, once the results are available) can be used to approximate consumption by the general population in California that consumes only commercial species. Additionally, because several studies have indicated that total fish consumption by fishers is greater than sport fish consumption (fishers supplement their catch with commercially available species), estimates for sport fish consumers should be increased to account for supplemental consumption of commercial species, or total consumption, by sport fishing populations in California. Limited data suggest that the difference in amount between sport and total consumption ranges from approximately 8 to 42 g/day.

Insufficient data are available to estimate consumption rates for shellfish, although several studies have shown that shellfish and other invertebrate species were among the most commonly caught species by sport fishers, particularly in certain areas including the Pacific region. The rates derived for sport fish consumption by fishing populations in California can reasonably be applied to consumption of shellfish species by those people who catch shellfish as opposed to finfish.

Although reliable estimates of portion size are essential to deriving accurate estimates of consumption rates, data on actual meal size are limited. Assumptions about portion sizes are inconsistent among fish and shellfish consumption studies, but typically ranged from four to eight ounces of fish and/or shellfish per meal. Actual mean meal or portion sizes, when reported, usually ranged from four to eight ounces.

Exposure within a population can best be described by distributional analyses rather than a single point estimate of fish consumption rates. Using a stochastic analysis or at least the median, mean, and an upper percentile rate of intake derived from a distributional analysis will allow a better characterization of consumption in a population and the variability within that population.

Studies on fish and shellfish consumption continue to be performed and released. New information that is pertinent should be considered along with this report as it becomes available.

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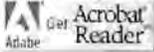
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